pale, bulky, with abundance of undigested fat, and showed evidence of putrefactive changes. In the fæces and stools obtained by calomel catharsis from the upper intestine, the normal bacilli, viz. gram-negative forms belonging to the *B. coli communis* and *B. lactis aerogenes* group, appeared absent, while the bacterial elements belonged to the gram positive group, the most constant being one which the author named *B. infantilis*.

As improvement set in there was a gradual return to normal bacterial conditions. The author says that the relation of *B. infantilis* to the genesis of infantilism must be left open, but it is certain that in its most extreme form intestinal infantilism is associated with the persistence and dominance of types of intestinal flora which belong to the period of infancy, and the persistence of which, in the third to eighth year of life, must be regarded as pathological.

The author believes that the cause of arrested development is due to serious defect in the power of absorption and digestion of food-stuffs. In treating these cases he found that drugs, purgatives, and intestinal antiseptics, gave little help. With careful hygienic and dietetic supervision the intestinal disturbance was checked, and gradually, although often with the utmost difficulty, an increase of weight followed.

The observations on which this study is based were of a purely clinical nature, and the deductions cannot be accepted as conclusive, but they are suggestive and interesting, and are presented by an investigator of experience. L. G. A.

PLASTICITY IN PLANTS.

The Heredity of Acquired Characters in Plants. By the Rev. Prof. George Henslow. (London: John Murray, 1908.) Pp. xii+107; 24 illustrations. Price 6*s*. net.

THE object of Prof. Henslow's book is "to prove that evolution—so far as plants are concerned—depends upon the inheritance of acquired characters." "This was Darwin's contention." See, for instance, the summary statement on p. 424 of the sixth edition of the "Origin of Species"! "Present-day ecologists who study plants in nature are all at one in accepting the fact that evolution in plants is the result, not only of a natural response to the direct action of changed conditions of life, by means of which they evolve new structures in adaptation to their new environments, but that these acquired characters *can* become hereditary." The author calls this, for some strange reason, "the true Darwinism." His general argument, which is backed up by many very interesting facts, may be illustrated by taking the following instance:—"A certain plant of a Trichosanthes, happening to have its tendrils touching the wall of the glass frame in which it grew, instantly developed a number of minute pads which adhered to the wall, though such a structure is not known to exist in the cucumber family at all." A common sea-weed, *Plocamium coccineum*, makes similar pads if a tip happen to press against another sea-weed. Mere mechanical force produces through response hereditary structures. In the American Virginia creeper the tendrils form adhesive tips when they touch the wall. These are not hereditary, but the power to form them is. In the Japanese Virginia creeper they are partially developed before there is any contact with the wall. "They are hereditary, but quite useless until contact has taken place, when they at once begin to develop into perfectly adaptive structures. Such is obviously a result of a response with adaptation to a purely mechanical contact of the soma with the wall, and before any reproductive germ-cells exist." As the author says, "botanists have this great advantage; they have *facts* to deal with, and no theories whatever to maintain."

Prof. Henslow's book is of much value in giving fine examples of the plasticity of plants under external stimulus, *i.e.* of the appearance of new features in unwonted conditions. But it is difficult to decide how far the observed change of structure in an individual plant is a direct result of the environmental influence, and how far it is due to the liberation or inhibition of constitutional possibilities established long ago. The author thinks the first view is the correct one, and he points out that similar modifications are exhibited in similar conditions by many quite unrelated plants. As to the heritability of modifications the individual occurrence of which is recognised by all, Prof. Henslow admits that changed plants may at once begin to change back again when the novel stimulus is withdrawn, but he maintains that the acquisition may last long enough to show that it was hereditary. This is a crucial point, and should have been worked out more precisely. The author gives cases like the following:—Lesage made plants, such as garden-cress, succulent, by watering them with salt water; plants raised from seed of the somewhat succulent salted plants were still more succulent in the following year.

The general conclusion of Prof. Henslow's book is that "the origin of species is due to the joint action alone of the two great factors of evolution—*Variability* and *Environment*—without the aid of natural selection; although we are, and are likely to remain, profoundly ignorant of the mysterious process (of *Response*) within the organism by which it is effected."

AGRICULTURAL CHEMISTRY.

Elementary Agricultural Chemistry: a Handbook for Junior Agricultural Students and Farmers. By Herbert Ingle. Pp. ix+250. (London: C. Griffin and Co., Ltd., 1908.) Price 4*s*. 6*d*. net.

TEACHERS at agricultural schools and colleges are placed in the difficult position of having to teach a branch of applied chemistry to pupils who have little time, and often less inclination, to study pure chemistry. The best method of procedure has probably not so far been found, nor has agricultural chemistry as yet fallen into the hands of the text-book writer to anything like so complete an extent as its parents on both sides. It is, however, pretty clear what the agricultural student ought to be able to do. He should have a good working conception of

chemical change, and be able to trace out the broad outlines of the great natural cycles involved in the synthesis of plant substances from carbon dioxide, water, &c., and their decomposition in the animal system or the soil with production once more of carbon dioxide, water, and other bodies. He should study the factors concerned in plant growth, the soil in its relation to the plant, and the plant, considered as food, in its relation to the animal; and, as the subject has a commercial side, he must be able to interpret the analysis of a feeding stuff or manure, and to make simple calculations involving a knowledge of the chemical composition of a few common substances. The scheme of teaching must take account of the rather special nature of the student. A young man commonly chooses agriculture as a profession because he loves the outdoor life of the farm and is of a keenly practical turn of mind, and this temperament is generally incompatible with systematic study of a subject for its own sake; he will work, however, and work hard, when his studies obviously subserve a useful end and fit in with the central idea of his life.

The book before us shows how Mr. Ingle teaches agricultural chemistry, and the record of one teacher's methods and experiences cannot fail to be interesting to others who are engaged in the same work. The student is supposed to have gone through a course of inorganic and organic chemistry, but by way of recapitulation an introductory chapter deals with general chemical conceptions, and another with the composition of the atmosphere. We then pass on to a study of the soil, the plant, manures, feeding, and dairy work. The author tells us in the preface that the book was written whilst he was in touch with South African agriculture, and the illustrations are drawn sometimes from English, sometimes from South African practices.

The chief defect of the book is that it fails to present the subject as a whole, and successive chapters seem to have little connection one with the other. There is no systematic discussion of the relationship between one branch of the subject and another, and the reader gets a sense of much detail but no general principles. In the mass of detail certain things have got left out which certainly ought to have gone in. Chief of these is the physical composition of soil as shown by mechanical analysis, concerning which not a word is spoken, in spite of its fundamental significance in soil work. No mention is made of the loss of nitrogen from soils by aërobic bacterial action. There is also, and perhaps necessarily, a lack of proportion; thus the grasses get no more space than the sweet potato, notwithstanding their enormously greater technical importance.

Indeed, the book is not so much an elementary text-book as a short reference book, and from this point of view it will be found very useful for class work. There is a great collection of data from many sources, the compilation of which must have involved an enormous amount of labour, and for which the teacher will have much cause to be grateful to Mr. Ingle.

E. J. RUSSELL.

TIMBER.

Timber. By J. R. Baterden. Pp. ix+351. (London: Archibald Constable and Co., Ltd., 1908.) Price 6*s.* net.

THIS popular manual undoubtedly contains interesting and miscellaneous information about the uses, preservation, and strength of timbers. The author, who is an engineer, occasionally refers to useful matter in engineering publications, and has compiled extensively from the reports of the forest officers of the various British colonies and of the United States. It is unfortunate, however, that he has attempted to write a general treatise. He is confessedly ignorant of botany; and his account of the structure and origin of the numerous species dealt with is usually meagre and defective, and in many instances almost puerile. His frequent descriptions of trees in the living state are out of place in a small manual, the subject of which is timber, and not forestry. The same remark applies to many of the illustrations, which are irrelevant. Hackneyed pictures of the common oak, beech, larch, &c., growing in the isolated state, only serve to show (but Mr. Baterden and his publisher are unaware of this) how trees ought not to be grown, if they are to be regarded as producers of timber of proper shape and quality.

European timbers, which should have been fully treated, on account of their great importance to the home grower and consumer, are dismissed by Mr. Baterden in a short chapter, which contains some singular errors and omissions. The bibliography at the end of the volume does not include the *Quarterly Journal of Forestry* and the *Transactions of the Scottish Arboricultural Society*, journals from which much useful material might have been extracted. Only three lines are devoted to the cricket-bat willow, the wood of which is the most costly produced in England. No allusion is made to native species, like the white-beam and the service tree. A more glaring omission occurs in the account of home-grown poplars, where nothing whatever is said about the black Italian poplar (usually referred to *Populus canadensis*), which is the most common species in cultivation and the fastest in growth. Nobody will be much the wiser by reading the following article:—"Plum, which is somewhat similar to pear, is also used for turnery. Weight about 40 lb. per cubic foot." The durmast is erroneously considered to be something different from *Quercus sessiliflora*, with which it is identical. The timber of the Turkey Oak, which every forester knows to be of poor quality, is said to be suited for the same class of work as the common oak.

The timbers of North America are dealt with at great length; and Lebanon cedar appears amongst them. The Atlas cedar is never mentioned, though, both on account of its valuable timber in Algeria and its successful cultivation in England, it deserves an extended notice. The beautiful yellow cedar of British Columbia and Alaska, which may be seen growing with great vigour in many of our parks,